The ABCs of Tech Prep

The Cornerstone of Tech Prep Series

Published by CORD in Waco, Texas

Multiple copies are available from CCI for $3.95 each. For more information, call 800-231-3015.

Printed in the United States of America

June 21, 1999

Contents

PREFACE

Tech Prep is a "teenager." This broad-based reform, begun in the early 1980s, is evolving into the system that has replaced general education and will replace traditional vocational education because Tech Prep is based on high academic standards, high achievement for all students, and advancement of its graduates into higher education and high-wage, flexible career paths.

Successful Tech Prep programs occur in one locality at a time and require the vision, cooperation, and mutual support of educators (secondary and postsecondary), employers, families, and policymakers in the community. In the last ten years, Tech Prep has evolved based on successful practices and anticipated needs. Because it is constantly changing and improving, Tech Prep is hard to define and often confusing to new practitioners in this exciting field.

Many current leaders and practitioners in Tech Prep have been active in this field for less than two years. These "newcomers" want to get up the Tech Prep ladder quickly. They need a primer on definitions, legal and acceptable practices, and practical advice on what works—and what doesn't work.

The ABCs of Tech Prep is designed to provide educators, families, and business and community leaders with concise information, definitions, historical perspective, and practical ideas about how this broad, effective reform initiative can be (and is being) used to improve schools, student achievement, and the quality of the workforce. It provides tips and strategies for consortium development and success.

A special thanks to Dan Hull, Hope Cotner, Pam Fails, John Souders, Nikki Fossett, Alecia Ward, and Martheil Mauthe-Clanton for their help in shaping the content of this book; to Gwen Burnham for compiling and correcting the manuscript; to Sarah Hunter for designing the cover; and to Kay Liston and Mark Whitney for editorial support.

Julie Grevelle
May 1999

TECH PREP EXPLAINED

Tech Prep is a dynamic educational reform movement that involves:

- partnership
  - schools (secondary and postsecondary)
  - employers
  - families and community leaders
- a process of teaching and learning
  - expects the same levels of high achievement from all students
  - recognizes and addresses a variety of learning styles
  - integrates practical applications into academics
- a curriculum structure
  - is central, but not limited, to grades nine through fourteen
  - keeps student choices and career/educational options open
  - prepares students for critical thinking and lifelong learning

The purpose of Tech Prep is to prepare any student to enter and succeed in a career.

THE BACKGROUND

Tech Prep emerged from the convergence of two critical developments in American society:

1. the shift from an industrial to a technology-driven economy with growing demand for a highly skilled workforce, and
2. the regrettable state of our nation's high schools, which were adequately preparing only the top 25 percent of students, leaving the "neglected majority" to fend for themselves.

Shortly before 1980, leaders in business and industry began to realize that computer-driven automation and the globalization of the workforce were having a profound effect on how work (especially manufacturing) was done and who would do it. To remain competitive, U.S. employers would have to replace low-skill, high-wage employees in assembly, telecommunication, and retail sales (for example) with computers, robots, or workers in developing countries who could perform comparable tasks for a small fraction of the pay received by workers in the United States. This reality was documented in a 1990 report by the Commission on the Skills of the American Workforce entitled "America's Choice: high skills or low

At the same time, most U.S. students (the non-college bound) were graduating from high schools with pitifully low achievement in academic fields (math, science, and communication). The general track in America's high schools was being used for "social promotion" of students through dumbed-down academics and watered-down alternate graduation plans. Vocational education in high schools and in colleges had become a dumping ground where problem students and low achievers were being taught hand skills. High school vocational courses were not considered integral to carefully planned, career-oriented programs of study and had little to

do with the real demands of the workplace. It became apparent that three major changes were imperative:

1. All students must attain high academic goals.
2. The general track in high school must be eliminated; all students in high school must have well-defined plans of study based on their goals after graduation (higher education and/or work).
3. "Dead-end" vocational courses and programs (in high schools and community colleges) must be replaced by preparatory programs based on an academic foundation and advanced skills for world-class careers.

The Emergence of Tech Prep

Since the early 1980s, educators and employers have been working together to resolve this crisis in our schools. They began with 2+2 articulation, a process in which the curriculum of the last two years of high school is seamlessly connected to two years of study at a community college. This initiative, which brought together high school and community college faculties, helped to eliminate duplication of coursework and created incentives for students to continue their technical education after high school. However, students were still unprepared in academics, and community colleges were spending more and more effort and money to remediate entering students in mathematics and communication.

Along with the introduction of articulation into high school and community college programs, there was a significant collaborative effort involving over thirty state agencies in conjunction with CORD and AIT (nonprofit curriculum developers). The result of this effort was an innovative movement in contextual teaching and learning. Research, curriculum development, and broad implementation of contextual instruction (in conjunction with teacher training) showed that nearly all students could be high academic achievers in math,

science, and communication if teaching methods and content were adapted to match the "applied" learning styles of most students.

In his 1984 book *The Neglected Majority,* Dale Parnell defined Tech Prep: Associate Degree programs that combined 2+2 articulation with strong academics through applied learning techniques and employer support. In 1990, when Congress reauthorized the Perkins vocational/technical legislation, a Tech Prep section was included that provided federal funds, administered through the states, to establish Tech Prep consortia (local partnerships of high schools, community colleges, businesses, and labor). The purposes of the consortia were:

I. To develop articulation agreements for seamless high school-postsecondary programs that
   A. raised academic achievement in math, science, and communication skills and that
   B. prepared students for certificates or associate degrees through community and technical colleges or apprenticeship programs; and

II. To address employer needs for workers with advanced skills.

In 1991, Dale Parnell and Dan Hull authored the book *Tech Prep/Associate Degree: A Win-Win Experience*, in which they provided rationale, guidelines, structures, and processes for forming and operating TPAD programs. The authors strongly encouraged the use of applied academics for contextual learners (the neglected majority). For the applied academics to form the basis of Tech Prep curricula, it was necessary to begin them in the ninth and tenth grades—thus the conversion from a 2+2 program to a 4+2 program. In 1993, Congress amended the Perkins legislation to allow Tech Prep spending to begin in the ninth grade.

Concurrent with growing recognition of the need for improved academic and technical coursework, employers were calling for "employability skills." In 1993, Arnold Packer led the Secretary's

Commission on Achieving Necessary Skills (SCANS), a U.S. Department of Labor initiative that produced the report entitled "What Work Requires of Schools: A SCANS Report for America 2000." This was the defining document that called for a third set of standards (in addition to academic and skills) in critical thinking, using information and technology, working in teams, interdisciplinary problem solving, and various other so-called soft skills.

However, national leaders as well as curriculum specialists quickly recognized the need to better design academic and technical curricula in the high school and community college to integrate skills and concepts. The traditional coursework was too fragmented and out of date to meet future workforce needs. In addition, the provision of more advanced technical skills was necessary in postsecondary curricula. The release of the SCANS report further solidified the need to adjust teaching methodologies with more integrated curricula.

As School to Work came to the national forefront in 1994, it was clear that Tech Prep needed a stronger focus on employer involvement. The curriculum needed to be strengthened by inclusion of future workforce skills and applications that could be provided only by employers in worksite learning experiences. Likewise, School to Work was a movement that needed more support from the education community than from the workforce training community. It was first seen as a workforce training initiative driven by the U.S. Department of Labor. Thus, School to Work needed connection with Tech Prep, and vice versa. School to Work was touted as a new system to support all forms of workforce preparation, including initiatives such as Tech Prep. Unfortunately, the messages of School to Work and Tech Prep were misunderstood by both the education and workforce training communities. Politics came into play and efforts to bring the two initiatives together failed in some areas.

In October 1998, the U.S. Congress reauthorized federal support of Tech Prep. Through the Carl D. Perkins Vocational and Applied Technology Education Act, Tech Prep consortia throughout

the country have been given the challenge of redefining Tech Prep for the next century. Efforts to change the face of this reform are under way at local, state, and national levels. One of the goals of the next generation of Tech Prep is to ensure that education for the neglected majority has standards equal to those of college prep. Achievement of this goal requires strengthening the academic and technical curriculum and revolutionizing teaching through innovations in educational technology.

THE NEED

- Less than 30 percent of all high school graduates earn baccalaureate degrees. Most good jobs require education and training beyond high school but not at the baccalaureate level.
- Most careers that pay salaries higher than minimum wage require strong academics and technical and/or career-oriented education beyond high school.
- The education system should be designed to prepare all students, not just a special few, for careers and education after high school.
- The traditional high school diploma will no longer prepare students for the workplace—new standards must be implemented into the curriculum.
- Most students learn more effectively when academics are taught in context.
- All high school students should choose and follow plans of study designed to prepare them for the next step after high school graduation (work and/or higher education).
- New 4+2 Tech Prep curricula must be designed to incorporate academic, skill, and employability standards.

THE TECH PREP STUDENT

- Any learner can be a Tech Prep student.
- Tech Prep students are usually in high school or community college.
- Children can start learning about careers in elementary and middle school.
- Students can use their Tech Prep education as the foundation for four-year college or university degrees.
- All Tech Prep students should benefit from contextual teaching and the continuity of a seamless curriculum.
- The most important aspect of Tech Prep is to target the needs of the neglected majority of students. Neither top achievers nor special-needs kids, they are the average students whom American education is not serving adequately. For the most part they have little direction, low expectations, and, left on their own, little hope of becoming all they can be. We mistakenly make two assumptions about these students:
  - They can't be motivated to learn.
  - They don't really have the ability to handle academic subjects.

THE FEDERAL DEFINITION

Nearly all Tech Prep consortia receive at least some of their financial support from federal funds appropriated through the Carl D. Perkins Vocational and Applied Technology Education Act. The Tech Prep section of this act provides a definition of Tech Prep that requires compliance by grantees.

Consortia funded through September 30, 1999, operate under the definition provided from Public Law 101-392, Carl D. Perkins Vocational and Applied Technology Education Act of 1990. After October 1, 1999, federal funding for Tech Prep will be administered under the reauthorization of this act, Public Law 105-332, Carl D. Perkins Vocational and Applied Technology Education Amendments of 1998. Key excerpts from both the 1990 and the 1998 acts are provided below.

Excerpts from Public Law 101-392 Carl D. Perkins Vocational and Applied Technology Education Act of 1990

SEC. 342. FINDINGS AND PURPOSE.

a) FINDINGS.—The Congress finds that—

4) the establishment of systematic technical education articulation agreements between secondary schools and postsecondary educational institutions is necessary for providing youths with skills in the liberal and practical arts and in basic academics, including instruction in the English language, and with the intense technical preparation necessary for finding a position in a changing workplace;

SEC. 344. TECH-PREP EDUCATION PROGRAMS.

a) GENERAL AUTHORITY.—Each grant recipient shall use amounts provided under the grant to develop and operate a 4-year tech-prep education program. *(Modified in 1992 to "a 6-year tech-prep program.")*

b) CONTENTS OF PROGRAM.—Any such program shall—

   1) be carried out under an articulation agreement between the participants in the consortium;

   2) consist of *("at least" added in 1992)* the 2 years of secondary school preceding graduation and 2 years of higher education, or an apprenticeship program of at least 2 years following secondary instruction, with a common core of required proficiency in mathematics, science, communications, and technologies designed to lead to an associate degree in a specific career field.

Excerpts from Public Law 105-332 Carl D. Perkins Vocational and Applied Technology Education Amendments of 1998

TITLE II—TECH-PREP EDUCATION

SEC. 201. SHORT TITLE.

This title may be cited as the 'Tech-Prep Education Act.'

SEC. 202. DEFINITIONS.

1. In this title:

   a) Articulation agreement.—The term 'articulation agreement' means a written commitment to a program designed to provide students with a nonduplicative sequence of progressive achievement leading to degrees or certificates in a tech-prep education program.

   b) Community college.—The term 'community college'—

      i) means an institution of higher education, as defined in section 101 of the Higher Education Act of 1965,

that provides not less than a 2-year program that is acceptable for full credit toward a bachelor's degree; and

ii) includes tribally controlled colleges or universities.

c) Tech-prep program.—The term 'tech-prep program' means a program of study that—

i) combines at a minimum 2 years of secondary education (as determined under State law) with a minimum of 2 years of postsecondary education in a nonduplicative, sequential course of study;

ii) integrates academic, and vocational and technical, instruction, and utilizes work-based and worksite learning where appropriate and available;

iii) provides technical preparation in a career field such as engineering technology, applied science, a mechanical, industrial, or practical art or trade, agriculture, health occupations, business, or applied economics;

iv) builds student competence in mathematics, science, reading, writing, communications, economics, and workplace skills through applied, contextual academics, and integrated instruction, in a coherent sequence of courses;

v) leads to an associate or a baccalaureate degree or a postsecondary certificate in a specific career field; and

vi) leads to placement in appropriate employment or to further education.

At the completion of the third phase, which should last no longer than two years (full time), Tech Prep completers will have one or more of three types of certification:

- They will have met business/industry standards for employment in their chosen fields.
- They will have obtained associate degrees.
- They will have been accepted for continued education at universities so they can work toward baccalaureate degrees.

Note that the previous figure shows two additional components. One is a *pre-Tech Prep* component that would prepare students for the choices that move them into either Tech Prep or college prep. This phase, which ideally should begin in kindergarten, would involve contextual learning and career awareness from an early age, preparing students to move smoothly into Tech Prep when they reach ninth grade.

The other additional component would be articulation from associate degree programs to four-year college or university programs with the goal of earning baccalaureate degrees. This should always be an option for Tech Prep students.

Very little work has been done so far on incorporating either of these "outside" phases into the primary Tech Prep curriculum. Both must be clearly defined and understood before Tech Prep can offer the kind of seamless, flexible educational program that today's students need to prepare for the future.

ORGANIZING AND OPERATING A TECH PREP CONSORTIUM

Necessary Partners and Their Roles[1]

The success of any Tech Prep program requires a committed partnership involving representatives from a number of key groups. This section lists suggested roles and responsibilities of administrators, teachers, counselors, and business and industry representatives.

College Presidents

- Develop a vision of Tech Prep for the college in conjunction with secondary system director(s) and superintendents
- Communicate and sell the Tech Prep vision
- Develop a Tech Prep philosophy and college policies

College Deans

- Identify college planning-team members
- Assist in leading the Tech Prep project
- Coordinate planning for Tech Prep with key groups
- Assist in Tech Prep project management

School Superintendents

- Develop a vision of Tech Prep for the school district in conjunction with community college presidents and vocational directors

---

[1] From Debra Bragg, *Illinois Tech Prep Planning Strategies* (Illinois State Board of Education, August 1991).

- Communicate and sell the Tech Prep vision
- Develop a Tech Prep philosophy and district policies

School Principals

- Identify school planning-team members
- Provide building-level support
- Assist in developing a Tech Prep philosophy and school policies

Vocational Directors

- Assist in development of the Tech Prep vision and philosophy
- Facilitate communication about Tech Prep across participating vocational systems and institutions
- Gain local support and resources for Tech Prep
- Assist in curriculum integration activities
- Assist in staff development efforts
- Identify planning-team members
- Assist in Tech Prep project management
- Develop and coordinate marketing efforts

Academic Teachers

- Identify academic applications for an integrated academic and technical curriculum
- Design and develop an integrated curriculum jointly with vocational-technical faculty and others
- Plan and participate in team teaching of the integrated curriculum
- Assist in designing staff development, particularly to meet the needs of the academic faculty

- Assist in designing articulation agreements
- Educate others about Tech Prep

Technical Teachers

- Identify technical applications for an integrated academic and technical curriculum
- Design and develop an integrated curriculum jointly with academic faculty and others
- Plan and participate in team teaching of the integrated curriculum
- Assist in designing staff development, particularly to meet the needs of the technical faculty
- Assist in designing articulation agreements
- Educate others about Tech Prep

Business/Industry/Labor Representatives

- Identify and commit to providing work-based learning experiences
- Assist in identifying performance standards (academic and technical)
- Assist in developing and providing incentives for students (e.g., work experience, guaranteed job placement)
- Assist in providing internships for faculty
- Share resources (e.g., expertise, time, meeting facilities)
- Update faculty members on current technologies and assist with team teaching
- Review marketing plans and tools
- Educate other employers about Tech Prep and gain support from them

Counselors

- Inform students, parents, and others about Tech Prep
- Counsel students about participating in Tech Prep
- Assist in designing the Tech Prep components
- Assist students with career planning
- Help students arrange work experiences
- Assist students in planning Tech Prep programs of study
- Promote Tech Prep and its options to students and parents

Lessons for Managing Time and Administration

Whether attempting to get new consortia up and running or taking over established consortia, new Tech Prep coordinators face a daunting challenge. They must have vision and determination. They must be able to ensure that time and resources are used efficiently and that every activity that falls under their supervision is focused on positive results. Following are some thoughts on how to keep a consortium "lean and mean."

1. *Make sure every committee serves a clear purpose.* A poorly focused or superfluous committee wastes time that could be spent on other activities. Before forming any committee, make sure it's really needed. If you are a new director of an established consortium, reexamine the purpose of each standing committee and whether its purpose could be better served in another way. Avoid the trap of doing anything just because "that is the sort of thing we have always done."
2. *Avoid paperwork and processes that aren't useful.* If the reports and surveys being used don't provide useful information, revise or do away with them. Streamline all processes. The best way to do this is to ask the opinions of

those most affected by the processes and paperwork in question (usually teachers).

3. *Conduct meetings that generate action.* As a general rule, every meeting should lead to action, not just discussion. While it is often appropriate to hold "get acquainted" meetings solely for the purpose of establishing trust and communication among program participants, these meetings need not be continued after participants have gotten to know one another. E-mail and listservs provide excellent ways for people to keep in contact.

4. *Offer effective professional development.* Professional development is a key component of any successful Tech Prep program. For suggestions on effective professional development, see "Chapter 14, Professional Development" of *Tech Prep: The Next Generation* by Dan Hull and Julie Grevelle.

5. *Offer up-to-date, relevant courses.* As new ideas from SCANS and other aspects of career exploration were introduced, many schools generated new courses in isolation without considering how these courses fit into the total curriculum and pedagogy. Review the purpose and content of the career-oriented courses offered through your consortium, and revise or replace the ones that are outdated or that do not contribute to the overall objective or your program.

6. *Be idealistic.* The success of any Tech Prep consortium depends to a large extent on the idealism and enthusiasm of the coordinator. If you are starting a new consortium, remember that other people's enthusiasm will be a reflection of yours. If you are taking over an established consortium, you may have to deal with cynicism caused by time or personality conflicts. These can be difficult barriers to overcome, but a new coordinator's idealism can clean the slate for new ideas and energy.

7. *Involve new players in the school system.* As you consider educational technology, family involvement, and other education issues, involve key experts within your school systems. Often individuals at the state and local levels are looking for means to work within the system and also can bring resources to bear.

8. *Keep meeting time to a minimum.* There is no better way to kill enthusiasm for Tech Prep than to give people the impression that you are wasting their time, whether with meetings, workshops, or unnecessary paperwork. Even too many E-mails can drive away advocates of Tech Prep. One way to manage this problem is to use several methods of communication with committees or volunteers. Meet in person only when face-to-face communication is necessary, and limit the discussion to one or two issues. Save the rest for correspondence via E-mail or conference calls. If some committee members want to micromanage the details, involve them and leave the other participants alone. If you have a new committee member, spend time with that person before the meeting to get him or her up to speed before walking into a meeting. Try not to create situations in which people feel compelled to debate or discuss unimportant issues.

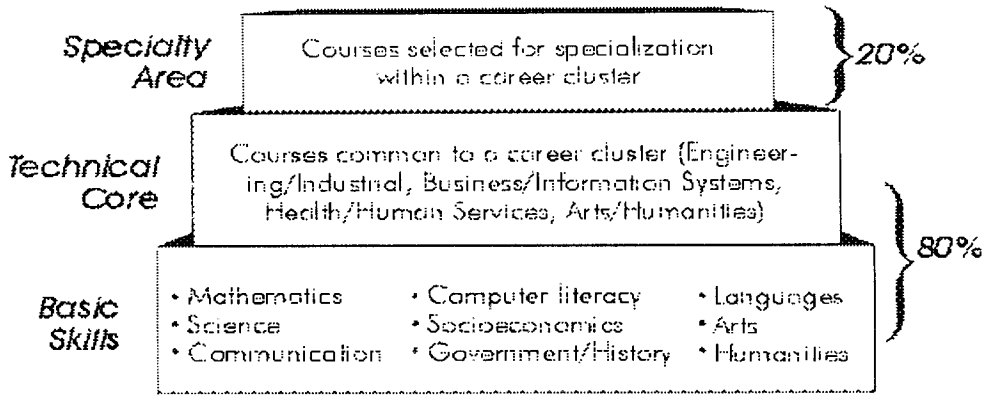
9. *Be creative.* There is no *one* way to carry out Tech Prep, and there will be many roadblocks along the way. The more innovative the solutions, the more interest you will create. Fresh ideas get attention—sometimes positive, sometimes not. It is worth the chance of upsetting a few in order to get people talking about new ideas. Just be sure to wear a hard hat to work every day.

DEVELOPING YOUR TECH PREP CURRICULUM

Understanding the Basic Elements of the Curriculum

The key to understanding Tech Prep curriculum design is the basic idea that a cluster of different occupations or jobs requires a common core of basic and technical knowledge and skills. This idea is based on the belief that basic skills and knowledge are essential for all students, regardless of the careers to which they aspire. It makes sense, therefore, for a student to begin by learning these basic, common skills, move on to acquire the skills common to a group of jobs (known as the technical core), then learn the specific skills required for a single profession.

The essential basic skills and technical core comprise approximately 80 percent of the overall curriculum. Specialty courses are normally necessary only during the postsecondary phase of a Tech Prep curriculum. These courses teach skills unique to an occupation or technology. The following figure illustrates basic skills courses (necessary for all students), technical core courses (necessary for students interested in a cluster of careers), and the specialty courses for those seeking entrance into specific occupations. The nature of this curriculum structure is not only practical to teaching the content, it is flexible enough to allow students to explore careers and change their occupational goals.



Foundation for Specialties Based on Basic Skills and Technical Core Courses

Some key objectives to keep in mind when designing a Tech Prep curriculum are:

1. A Tech Prep curriculum is distinctively different from vocational education in that it not only trains people to get their first jobs, but also prepares them for *careers*.
2. A Tech Prep curriculum requires the same standards of academic accomplishment as college prep, but it teaches content through courses based on contextual learning methods.
3. The career focus of the program of study creates greater interest in most students.
4. The curriculum must prepare students to meet technical standards for entering the workplace as well as academic standards for entering college.
5. The curriculum should be seamless in that there are no gaps or overlaps from one level of education to the next in a given program of study.
6. The technical core of the curriculum should be based on strong academics.

7. The high school portion of the curriculum should reflect broad technical courses that will connect to a variety of special fields.
8. In addition to strong academic and technical skills, new workers are required to practice "employability skills" (such as critical thinking, problem solving, and working in teams). These skills are defined more completely in the SCANS report "What Work Requires of Schools."

Where to Begin

1. Assemble the necessary partners to review all aspects of academic and technical curricula from middle school, high school, community college, and even the university.
2. Begin by reviewing course offerings and identifying redundancies and gaps in the curriculum.
3. Meet with business representatives in the community (e.g., the education committee of the chamber of commerce) to help you determine whether you are offering career preparation in all necessary fields of study.
4. Attempt to group fields of study into clusters of occupations that appear to have cores of common technical skills (e.g., engineering, health, business).
5. Identify local employers in each cluster area who will help to identify standards.
6. Start the process of identifying and validating standards with a set that has been accepted and build from there. (Contact your state skill standards office or the National Skill Standards Board to obtain a set of existing standards.)

What Are Standards?

In broad terms, standards fall into three major groups: academic, SCANS, and skill standards.

Academic Standards

First to emerge were academic standards in traditional subject areas such as mathematics, science, and history. Today, there are published national and state standards for more than a dozen subject areas, and several of these have guided further definition among the many emerging state standards.

SCANS Standards

A second area of standards is best represented by the U.S. Department of Labor's SCANS project, which defined "employability" skills. Employability skills are broader than traditional occupational competencies and represent skills that are useful in most jobs. Also within this category are skills that are important for all students to acquire, namely, those having to do with personal education, career, and life planning. These skills, the best examples of which have been compiled by the National Occupational Information Coordinating Committee,[2] speak not only to counselors but also to curriculum designers and teachers. In a new paradigm, career-planning skills are built into the curriculum as an area of knowledge that is important for students to acquire. With the rapid evolution of technology and work and the changing nature of employer/employee relationships, the ability to plan one's career has become critically important.

---

[2] Career Development Training Institute, *National Career Development Guidelines K–Adult Handbook* (Washington, D.C.: National Occupational Information Coordinating Committee, 1996).

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities needed for solid job performance.

Workplace Know-How

COMPETENCIES. Effective workers can productively use:

- *Resources*: allocating time, money, materials, space, staff
- *Interpersonal Skills*: working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds
- *Information*: acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information
- *Systems*: understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems
- *Technology*: selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

THE FOUNDATION. Competence requires:

- *Basic Skills*: reading, writing, arithmetic and mathematics, speaking, and listening
- *Thinking Skills*: thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning
- *Personal Qualities*: individual responsibility, self-esteem, sociability, self-management, and integrity.

Skill Standards

A third area of standards, often labeled "skill standards," comprises sets of specifications setting forth the knowledge, skills, and habits of mind necessary to perform in given occupational settings. Unlike the academic and employability standards, which have no clear antecedent in educational practice, occupational skill standards represent an evolution of traditional vocational competencies.

If the development of standards provides a forum for debate and an opportunity for consensus to emerge from divergent viewpoints, the resulting standards should be a useful point of reference in educational reform. Resistance to the use of standards arises from early misconceptions that should be corrected. First, it should be noted that standards, academic or otherwise, do not define the totality of content for courses or curricula. Rather, the standards establish a baseline framework representing a consensus concerning important concepts. These concepts must be considered in defining the expectations of the educational process relating to student accomplishment. Second, standards are in no way intended to define issues of personal or individual choice or infringe on constitutional freedoms that are essential to a democratic society. Standards are appropriate where reasonable consensus exists concerning the universal benefit that will result from their application and where there is a clear understanding that they do not intrude on individual freedoms.

Textbooks, reference materials, teacher expertise, and the many supporting materials used in the educational process are not replaced by standards. The rich variety and myriad details of all the subject fields cannot be captured in standards. Attempts to do so have proven to be cumbersome at best, and the results are not likely to find wide use.

Steps to Reforming Curricula Based on Standards

Standards should represent an essential part of the vision for reform and provide important contributions to reform goals and objectives. Considerable preparation may be necessary for educational institutions, boards, administrators, teachers, and community leaders to be committed to the use of standards as an integral part of the reform effort. In their book on the integration of academic and technical education, Gene Bottoms and Deede Sharpe offer a ten-step process for curriculum integration; five of the steps have to do with establishing the climate within which reform can proceed.[3] Until reform participants share a perception of the value of standards and an understanding of the multiple sources of relevant standards, it is unlikely that progress will be made.

When a commitment to the use of standards has been made, the logical steps to applying standards in curriculum reform are the following:

Step 1: Assemble all relevant standards.

The extent of this step is determined by the extent of curriculum reform being contemplated. If only selected courses are to be reviewed, fewer standards may be relevant than if the entire curriculum is to be reviewed.

Step 2: Analyze and crosswalk the standards.

As is indicated in "Chapter 3, Use of Standards in Curricula" in *Tech Prep: The Next Generation*, standards have been developed from many perspectives. There is no assurance that they are completely congruent, and it is essential that the various standards be

---

[3] Gene Bottoms and Deede Sharpe, *Teaching for Understanding Through Integration of Academic and Technical Education* (Atlanta: Southern Regional Education Board, 1997), pp. 86-108.

compared if curriculum reform is to be responsive to all the expectations set forth. Bottoms and Sharpe, for example, set forth six sources of expectations, some of which are not published and require local collection of information. The sources include state and national published standards, National Assessment of Educational Progress (NAEP) core competencies, and SCANS; but they also include perceived expectations of local employers and institutions of higher education.[4]

This analysis of standards is not a simple task, and has proven to be a stumbling block in applying standards to curricula. The temptation is to ignore some of the expectations. CORD has addressed this issue by developing an organized structure and carrying out the analysis for a number of standards in selected areas.[5]

Step 3: Align the standards to the curriculum.

After a comprehensive synopsis of standards and expectations has been developed, it must be compared to the goals and objectives of the courses, course sequences, and the total curriculum. The most effective approach is to look at the curriculum in total, across all subject areas and across secondary and postsecondary technical programs. This broad look at the curriculum accomplishes integration, eliminates duplication, and optimizes use of student time.

Step 4: Identify deficiencies in the curriculum vis-à-vis the standards.

Accomplishing step 3 will reveal where deficiencies exist in the curriculum. In particular, the SCANS skills and the complex skills

---

[4] Bottoms and Sharpe, pp. 96-97.

[5] See *Curriculum Integrator: Digest of Integrated Curriculum Standards* (Waco, Texas: CORD, 1997).

represented by Integrated Curriculum Standards (ICS) are typically found to be inadequately addressed.[6]

Step 5: Redesign the curriculum to correct the deficiencies.

When the deficiencies have been identified, the structure and sequence of the curriculum can be redesigned to address them.

Step 6: Design teaching enhancements to support the standards.

Both content and teaching and learning strategies can be modified to address the deficiencies. Some of the techniques described in "Chapter 3, Use of Standards in Curricula" in *Tech Prep: The Next Generation* can be brought to bear.

Step 7: Design assessments that verify attainment of standards.

Verification of student success is essential if the curriculum is to produce student mastery of required skills. The assessment methods and tools must be developed in direct reference to the standards.

Step 8: Develop an implementation plan.

Curriculum design is only part of the task. Professional development must be provided to assist teachers in dealing with the new paradigms, suitable texts and materials must be provided, laboratories may have to be revised, worksites must be established, and projects must be designed and implemented. Plans for all these details should be laid out realistically.

Step 9: Evaluate results.

Considerable effort and resources will go into curriculum reform. The implementation plan should include collection of suitable data to document the effects of the reform on student performance. Not all of

---

[6] An ICS is a standard of performance expectation that reflects a synthesis of business/industry standards, academic standards, and employability standards around a specified topic. For more, see *Curriculum Integrator: Implementation Guide* (Waco, Texas: CORD, 1997).

the desired changes may be possible in the first effort at reform. The concept of continuous improvement should be adopted with the recognition that reform is an ongoing and never-ending effort.

A Multiphase Curriculum

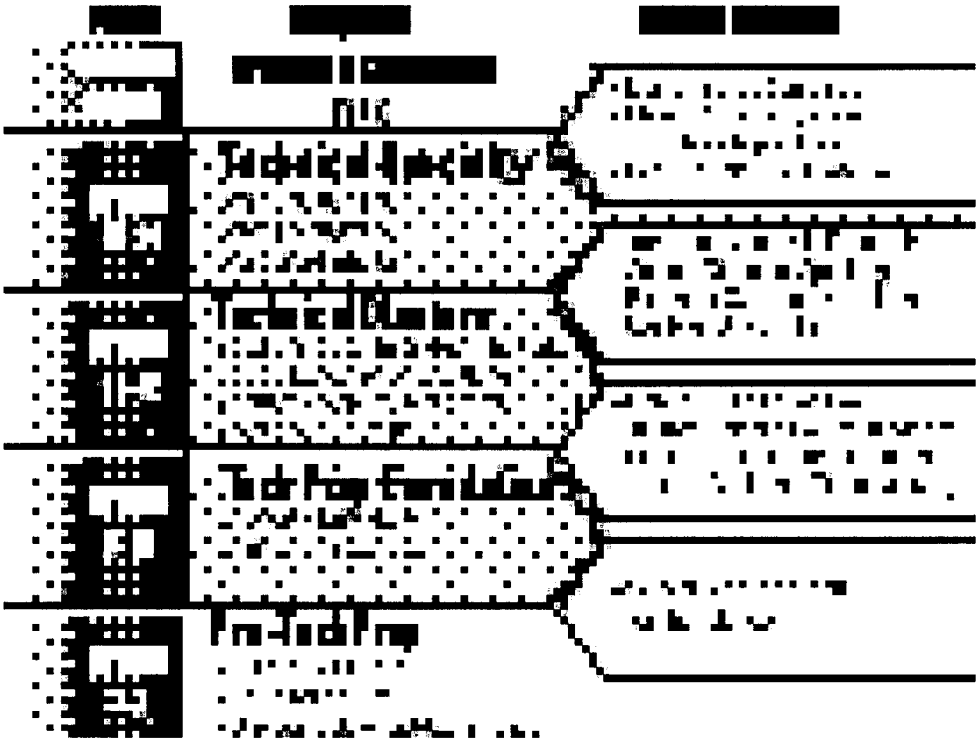
When the "need to know and do"—the desired, job-based educational outcomes—is established, it is the role of educators at the secondary and postsecondary levels to organize the scope and sequence of the academic and technical content and the laboratory and job experiences required to help students achieve these outcomes. This overall arrangement of content and experience is the foundation of the Tech Prep curriculum.

Although an articulated program like Tech Prep eventually must be divided into a secondary component, a postsecondary component, and perhaps a worksite component, ideally the total curriculum should be designed and organized as a single sequence, without regard for where or by whom the course work will be taught. When the design is complete, it will become appropriate to sort out which elements will be taught by high schools, which will be taught by community colleges, and which will be taught by employers.

What would a typical Tech Prep curriculum structure look like? The figure on the following page outlines a suggested model for a 4+2 curriculum and indicates the components and outcomes for each phase of the Tech Prep program. This model divides the curriculum into three major two-year phases.

The first phase, which begins in the ninth grade, is the *Tech Prep foundation* component. At the beginning of the ninth-grade year, students select the Tech Prep plan. At this early stage, all Tech Prep students, regardless of occupational interest, follow a common curriculum, building a foundation through applied academics courses and career exploration (as well as taking basic courses required for graduation).

Some states already are requiring some form of written plan, often called an education and/or employability development plan, to be drawn up at this stage. The plan may specify courses and work experiences in which the students will engage and competencies they will be required to demonstrate. Such plans are intended to be flexible or subject to change so that "tracking" of the students is avoided. At the same time, students are required to commit to a plan to avoid drifting through high school.



Components and Outcomes for Each Phase of the Tech Prep Curriculum

At the end of this initial two-year phase, Tech Prep students should be well on their way to obtaining solid foundations in math, science, and communication skills and should have received the help they need to make informed decisions about what kind of specialty they may want to pursue. Then, as they enter eleventh grade, students are asked to settle on specific occupational *clusters* (related groups of

occupations, such as business, health services, engineering technology occupations, or human services) from which they will later choose more specific occupations.

Phase two, which encompasses the eleventh and twelfth grades, is the *technical clusters* component of the curriculum. During this phase, in addition to taking more applied academics courses and general courses required for graduation, students begin to take technical courses that teach skills applicable to particular groups of careers.

Students enrolled in certain fields may also take some specialty courses, which may be combined with worksite learning experiences. For instance, a skills-oriented program such as welding might require that students begin taking welding classes in the eleventh and twelfth grades, especially if they plan to go to work immediately after high school graduation. This is also true for programs that are built through "magnet" high schools specializing in certain professions such as health care or criminal justice. Students will leave these magnet high schools with enough specialty courses to qualify for entry-level jobs in these fields.

Phase two of the Tech Prep curriculum ends with graduation from high school. At this point Tech Prep students should have acquired enough basic technical skills to seek entry-level work in their chosen specialties. Or they may choose at this point to enter universities and work toward baccalaureate degrees. (They should be able to do this with minimum additional preparation.)

Students who continue with the Tech Prep curriculum, however, then will enter the third, or *technical specialty,* component. For the next two years, they will be gaining advanced skills and/or work experience in their chosen fields of specialization. Ideally, they will be enrolled in associate degree programs at community colleges with the possibility of worksite learning components such as mentoring or apprenticeship.

ENSURING THAT YOUR CONSORTIUM PRACTICES CONTEXTUAL TEACHING AND LEARNING

Contextual Learning: The Theory and Description

Contextual learning is a proven concept that incorporates much of the most recent research in cognitive science. It is also a reaction to the essentially behaviorist theories that have dominated American education for many decades. The contextual approach recognizes that learning is a complex, multifaceted process that goes far beyond drill-oriented, stimulus-and-response methodologies.

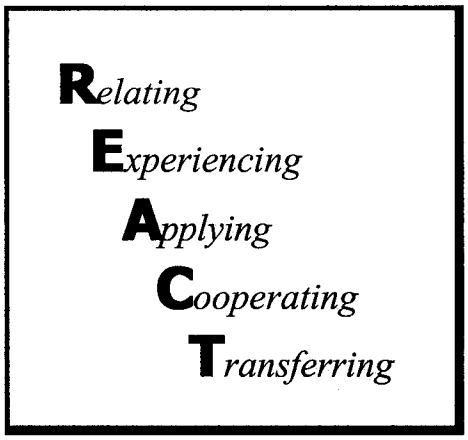
According to contextual learning theory, learning occurs only when students (learners) process new information or knowledge in such a way that it makes sense to them in their own frames of reference (their own inner worlds of memory, experience, and response). This approach to learning and teaching assumes that the mind naturally seeks meaning *in context*—that is, in relation to the person's current environment—and that it does so by searching for relationships that make sense and appear useful.

Building on this understanding, contextual learning theory focuses on the multiple aspects of any learning environment, whether a classroom, a laboratory, a computer lab, a worksite, or a wheat field. It encourages educators to choose and/or design learning environments that incorporate as many different forms of experience as possible—social, cultural, physical, and psychological—in working toward the desired learning outcomes.

In such an environment, students discover meaningful relationships between abstract ideas and practical applications in the context of the real world; concepts are internalized through the process of discovering, reinforcing, and relating. For example, a physics class studying thermal conductivity might measure how the quality and amount of insulation material in a building affect the amount

of energy required to keep the building heated or cooled. Or a biology or chemistry class might learn basic scientific concepts by studying the spread of AIDS or the ways in which farmers suffer from and contribute to environmental degradation.

Curricula and instruction based on this strategy will be structured to encourage five essential forms of learning: **R**elating, **E**xperiencing, **A**pplying, **C**ooperating, and **T**ransferring.



Essential Elements of the REACT Strategy

Relating. Learning in the context of life experience, or relating, is the kind of contextual learning that typically occurs with very young children. For toddlers, the sources of learning are readily at hand in the form of toys, games, and everyday events such as meals, trips to the grocery store, and walks in the neighborhood.

As children grow older, however, providing this meaningful context for learning becomes more difficult. Ours is a society in which the workplace is largely separated from domestic life, in which extended families are separated by great distances, and in which teens lack clear societal roles or responsibilities commensurate with their abilities.

Under ideal conditions, teachers might simply lead students from one community-based activity to another, encouraging them to relate what they are learning to real-life experience. In most cases, however,

given the range and complexity of concepts to be taught and the limitations of our resources, life experiences will have to be evoked through text, video, speech, and classroom activity.

The curriculum that attempts to place learning in the context of life experiences must first call the student's attention to everyday sights, events, and conditions; it must then *relate* those everyday situations to new information to be absorbed or problems to be solved.

E*xperiencing.* Experiencing—learning in the context of exploration, discovery, and invention—is the heart of contextual learning. However motivated or tuned-in students may become as a result of other instructional strategies such as video, narrative, or text-based activities, these remain relatively passive forms of learning. And learning appears to "take" far more quickly when students are able to manipulate equipment and materials and to do other forms of active research.

In contextual academics texts, laboratories are often based on actual workplace tasks. The aim is not to train students for specific jobs, but to allow them to experience activities that are directly related to real-life work. Many of the activities and skills selected for labs are cross-occupational; that is, they are used in a broad spectrum of occupations.

A*pplying.* Applying concepts and information in a useful context often projects students into an imagined future (a possible career) and/or into an unfamiliar location (a workplace). In contextual learning courses, applications are often based on occupational activities.

As noted above, young people today generally lack access to the workplace; unlike members of previous generations, they do not see the modern-day counterpart of the blacksmith at the forge or the farmer in the field. Essentially isolated in the inner city or outer suburbia, many students have a greater knowledge of how to become rock stars or models than of how to become respiratory therapists or power plant operators. If they are to get a realistic sense of

connection between schoolwork and real-life jobs, therefore, the occupational context must be brought to them. This happens most commonly through text, video, labs, and activities, although, in many schools, these contextual learning experiences will be followed up with firsthand experiences such as plant tours, mentoring arrangements, and internships.

C*ooperating.* Cooperating—learning in the context of sharing, responding, and communicating with other learners—is a primary instructional strategy in contextual teaching. The experience of cooperating not only helps the majority of students learn the material, it also is consistent with the real-world focus of contextual teaching.

Research interviews with employers reveal that employees who can communicate effectively, who share information freely, and who can work comfortably in team settings are highly valued in the workplace. We have ample reason, therefore, to encourage students to develop these cooperative skills while they are still in the classroom.

The laboratory, one of the primary instructional methods in applied academics, is essentially cooperative. Typically, students work with partners to do the laboratory exercises; in some cases, they work in groups of three or four. Completing the labs successfully requires delegation, observation, suggestion, and discussion. In many labs, the quality of the data collected by the team as a whole is dependent on the individual performance of team members.

Students also must cooperate to complete the many small-group activities that are included in the applied academics courses. Partnering can be a particularly effective strategy for encouraging students to cooperate.

T*ransferring.* Learning in the context of existing knowledge, or transferring, uses and builds upon what the student already knows. Such an approach is similar to relating, in that it calls upon the familiar.

As adults, many of us are adept at avoiding situations that are unfamiliar—the part of town we don't know, the unusual food we've never eaten, the store we haven't shopped. Sometimes we also avoid situations in which we have to gain new information or develop a new skill (especially if there are likely to be witnesses)—using a new type of software or coping in another country with our fledgling foreign-language skills.

Most traditionally taught high school students, however, rarely have the luxury of avoiding new learning situations; they are confronted with them every day. We can help them retain their sense of dignity and develop confidence if we make a point of building new learning experiences on what they already know.

Steps to Implementing Contextual Teaching

1. *Help educators gain an understanding of the theory and practices of contextual learning.* Develop a list of research articles and books that demonstrate that REACT strategies can address the needs of a wide diversity of students and enhance their learning. The successful implementation of contextual teaching is strongly correlated with a belief in its efficacy.
2. *Make certain that educators realize the changes required to implement contextual teaching.* Organize visits to schools and classrooms where contextual teaching has been successfully implemented. Potential adopters of a contextual teaching approach must understand that contextual teaching methods put new demands on teachers and administrators. After viewing these classrooms, teachers and administrators will have a better understanding of the power of contextual teaching and the infrastructure needed to support it.
3. *Stress the importance of selecting courseware that supports REACT teaching strategies.* Many high school textbooks claim they are contextually based. However, the

degree to which they support REACT strategies varies greatly. Suggest that textbook committees use the self-test on the following page as part of their selection criteria. A textbook that supports REACT strategies should generate several "yes" responses.

4. *Promote professional development*. Teaching contextually requires new classroom behaviors that typically encourage students to work cooperatively and depend more on themselves to construct new knowledge within the knowledge base they bring to the classroom. Thus, teachers must learn to become facilitators and develop new classroom management techniques for effectively conducting group activities.

5. *Encourage teachers to form support groups.* The initial stages of transitioning from a traditional to a contextual form of instruction are often difficult. Teachers find that lesson planning takes longer, since activity-based instruction requires more creativity and more materials preparation. Working cooperatively in a support group will bring about a synthesis that "spreads" the load in obtaining materials and designing creative classroom activities. Also, the "we are in this together" attitude fostered by a support group will help maintain teacher morale during the transition period.

6. *Advocate the development of new methods of assessment.* The old paper-and-pencil test is tied strongly to traditional styles of teaching and will not provide a fair assessment of a contextually based course. This type of course contains elements—laboratories, real-world problem solving, group projects—that are not common to traditional courses. Consequently, an authentic assessment of student achievement should go beyond written tests and should evaluate performances and products based on these unique elements. Examples of authentic assessment are portfolios, demonstrations, case studies, and structured evaluation.

7. *Connect teachers and students with industry.* For teachers to be most effective in implementing contextual teaching, they must understand how concepts are applied in the world of work. In recent years, business and industry have expressed great interest in supporting education. Help teachers find summer internships with companies in their communities. Experiences gained during these internships will help teachers to make their classroom presentations more "applied" and relevant to students. Another way of bringing industry into the classroom is to arrange classroom visits for local company representatives.

8. *Help teachers connect student learning to the world.* To effectively implement contextual teaching, teachers must move beyond courseware and keep searching for interesting, relevant examples that allow them to wrap disciplinary topics within the context of their use. Teachers are often frustrated in trying to make these connections. Demonstrate how newspapers and magazines can be used as sources of material for contextual examples, and encourage teachers to constantly seek examples from their own life experiences.

9. *Encourage educators to choose educational technology that embraces the REACT strategy.* Like other forms of courseware, much of the educational technology currently available is very traditional—skill-drill oriented. Look for technology that is contextually based and problem-solving oriented and that encourages group cooperation. This type of technology will complement contextual teaching and further ensure its successful implementation.

10. *Turn educators into leaders for educational reform.* Persuade educators to assume the responsibility of advocating and promoting the most effective learning processes and practices. Encourage them to become voices in educational reform and make presentations at local, regional, and national conferences. When educators become the driving force behind contextual teaching, rapid, large-scale implementation can take place.

IMPLEMENTING A PROFESSIONAL DEVELOPMENT PROGRAM

Developing a Program

Tech Prep programs allow students to discover meaningful relationships between abstract ideas and practical applications in the context of the real world. Concepts are internalized through the processes of discovering, reinforcing, and relating. This paradigm shift requires comprehensive professional development. Teachers must be empowered to translate the theory of contextual learning into classroom practice. They must understand the relationship between academic curricula and occupational practices and be able to relate real-life applications to students through a variety of experiences.

School support is critical to implementing a successful Tech Prep professional development program. Administrators, school counselors, teachers, and staff development coordinators must be committed to the systemic changes Tech Prep calls for and must consider professional development an open-ended process that is essential to the educational program. A high level of "buy in" should be obtained during the initial phase of planning the professional development activities.

Ideally a staff development committee will be formed by the consortium to represent the campuses. Members will be selected by school principals and will include administrators, teachers, and counselors. This committee should provide valuable feedback related to the needs of the staff members, including suggested formats for training.

A comprehensive plan should be developed to ensure that an organized, efficient professional development plan is implemented. Initial support from administrators will ensure that teachers receive an opportunity and encouragement to participate in the program.

Essential Topics for Training

A comprehensive Tech Prep professional development program will include a variety of opportunities for training on the following topics:

SCANS Competencies

Identifying and Addressing Multiple Learning Styles

Contextual Teaching and Learning

Cooperative Learning

Integrating Technology into Classroom Curricula

Contextual Academics

Academic and Occupational Curriculum Integration

Project-Based Learning

Problems-Based Learning

Authentic Assessment

Guidance and Counseling for Tech Prep Students

Teachers should have an opportunity to participate in workshops that meet their immediate needs and levels of experience related to each topic. Brief checklists may be used to assess the interests and needs of the administrators and teachers, as well as to determine the most convenient format for the program.

Selecting a Format to Gain Teacher Interest and Support

There are three proven ways to get teachers to attend workshops:

1. Flexible scheduling of the workshops
2. Compensation (money, graduate credit, or continuing education credit)
3. Release time

Are You Teaching Science Contextually?

Take this self-test and see.

These standards appear to some degree in almost all texts. But *contextual* instruction is rich in all ten standards.

1. Are new concepts presented in real-life (outside the classroom) situations and experiences that are familiar to the student?
2. Are concepts in examples and student exercises presented in the context of their use?
3. Are new concepts presented in the context of what the student already knows?
4. Do examples and student exercises include many real, believable problem-solving situations that students can recognize as being important to their current or possible future lives?
5. Do examples and student exercises cultivate an attitude that says, "I need to learn this"?
6. Do students gather and analyze their own data as they are guided in discovery of the important concepts?
7. Are opportunities presented for students to gather and analyze their own data for enrichment and extension?
8. Do lessons and activities encourage the student to apply concepts and information in useful contexts, projecting the student into imagined futures (e.g., possible careers) and unfamiliar locations (e.g., workplaces)?
9. Are students expected to participate regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision making occur?
10. Do lessons, exercises, and labs improve students' reading and other communication skills in addition to scientific reasoning and achievement?

It is a widely recognized fact that teachers are overworked and underpaid. Therefore, attending workshops is not often high on their list of priorities. Teachers are attracted to training that will help them solve classroom problems, save them time, or provide materials they can immediately implement in their classrooms.

To attend workshops, teachers must either be released from school or attend on their own time. If released from school, teachers must consider the lost class time, planning for substitutes, and the many details requiring their attention upon return to school. If attending on their own time, teachers want to be compensated. In either case, teachers must feel their time is being well spent. The schedule and preferences of administrators and teachers should be considered first when training format and schedule are being planned. Some districts have found success with the following scheduling options:

- in-service days planned in the school calendar
- short segments offered immediately after the school day
- weekend retreats
- summer institutes or sessions
- release days from classroom duties
- professional conferences

After a workshop has been scheduled and teachers are in attendance, how do you keep them interested and provide a positive experience? An informal survey of more than thirty applied academics teacher trainers identified the following ways to hold the interest of the educators at workshops:

1. Realize that teachers are experts and involve them in the workshop.
2. Model contextual teaching techniques.
3. Provide follow-up activities such as E-mail, videoconferencing, site visits, and phone calls.

4. Offer tested, up-to-date, hands-on activities that are ready to use when teachers return to class.
5. Organize peer groups so that teachers can support each other on an ongoing basis.
6. Share experiences and make the material relevant to each teacher's classroom situation.
7. Monitor progress, adjust the agenda, and be flexible to the needs of teachers.
8. Offer a variety of training activities such as theory, demonstration, practice, feedback and coaching.
9. Do not lecture.

Issues to Address with Campus Administrators

1. *Is the training part of a systematic campuswide change process, or is it the "training du jour" (to be replaced the next year)?* Nothing is more detrimental to teacher morale than to build excitement and support for a new idea, begin the training and implementation process, and then scrap the whole thing the following year.
2. *Does this training relate to and support other campus improvement initiatives?* It is important to understand how all the puzzle pieces fit together. If an educator doesn't see the connection between the training and the educational process as a whole, the tendency is to view the training as an add-on or "just one more thing they want me to do."
3. *Is there a long-term plan for ongoing training and use of materials?* Before any new training begins, plans should be made for follow-up training. Frequently, one-shot training results in useful information but nothing is done with it. There must be an expectation that the training will be implemented,

and the procedures for follow-up and evaluation should be explained in the initial training. Time must be provided for the teachers to discuss successes and failures with each other and the "experts." As implementation proceeds, higher levels of training may be desirable.

4. *Are necessary supplies available?* Make sure that the implementers have all the supplies necessary. Since contextual teaching generally involves hands-on projects, supplies beyond those required by conventional teaching are usually needed. While the cost need not be excessive, it should be accommodated in the budget.

Overcoming Attitudes and Beliefs

Before offering any professional development training, be aware of the following attitudes and beliefs:

1. We learned things in a traditional abstract lecture method and believe it served us well.
2. We define success by those who respond to traditional lecture methods because that is what is taught at universities.
3. We have to prepare students for standardized tests—there is too much detail to address this preparation in a contextual way.
4. There is not enough time and it is not practical to manage a classroom through nontraditional means.
5. We identify with the top 25 percent of students because they are already motivated to learn the way we learned in school.
6. We can explain concepts in our areas of specialization skillfully but find it difficult to give students credible instances in which the concepts are used in the world of work.
7. Learning in the context of the world of work is not useful and is too limiting. It will stifle students' creativity and imagination.

A fundamental reason for these attitudes is that teachers are naturally prone to teach the way they were taught. Most teachers are part of a self-perpetuating cycle based on one type of pedagogy—lecture/abstract—the one they are most familiar with from their own education. Most of the attitudes and beliefs listed above are born of this cycle, which does not give teachers the experience or the knowledge to feel comfortable with new methods.

Address these attitudes and beliefs by:

- Starting with a base of research. Present forceful evidence from research studies relevant to classroom practice.
- Making the training part of an ongoing process. Teachers can become frustrated if they have become aware of new methods but feel unable to use these methods in the classroom for various reasons. Study groups and opportunities for peer support are the best solution to this issue.
- Making sure your methods of training are reflective of contextual teaching practices. Each professional development program should include theory, demonstration, practice, feedback, and coaching.

FUNDING OF TECH PREP

Most funding of Tech Prep consortia begins with federal dollars authorized through the Carl D. Perkins Vocational and Applied Technology Education Act. The act has traditionally funded career/technology education, but since 1990 it has included a separate title for Tech Prep education. (See page 8 for the federal definition of Tech Prep as it appears in the legislation.) You can contact the U.S. Department of Education's Office of Vocational and Adult Education for more information on how this section of the legislation is carried out, and you can read the legislation on the Internet at www.thomas.loc.gov. Printed copies of the legislation can also be obtained through the Government Printing Office.

Congress appropriates funding for Tech Prep annually as part of the budgeting process. Appropriations determine the funding levels of Tech Prep. Traditionally this has varied from $90 million to $105 million per year, with some threats of no funding. Therefore, it is critical that Tech Prep consortia communicate to their legislators their progress and the importance of Tech Prep funds. This communication has proven to be crucial for justifying continued funding of Tech Prep. You can contact the National Tech Prep Network for more information on the progress and policies of Tech Prep in Congress. NTPN also provides updates and notices when funding is being considered.

As federal funding levels are determined, states receive Tech Prep funds based on a formula set in the Elementary and Secondary Education Act. The funds are distributed through state boards for vocational education, usually either the state K-12 education agency or the state higher education system. These dollars are matched by state funds and provided to local consortia by formula or competition.

In addition to the funds appropriated under the Tech Prep education title of the Perkins Act, the funds allocated for Title I of Perkins are directly related to Tech Prep. Therefore, it is important

that vocational departments at state and local levels work in conjunction with Tech Prep consortia to ensure the maximum use of these funds to support Tech Prep and career education respectively.

In 1998 Congress reauthorized funding for the Perkins Act, including Tech Prep education. Some significant changes were made to this legislation. It is important that each Tech Prep director get in touch with his or her state director of Tech Prep to request information about these changes. In addition, the U.S. Department of Education, Office of Vocational and Adult Education can provide details on how this new legislation will affect local consortia. Federal and state offices will publish guidelines on allowable uses of funds and methods for reporting or keeping account of these funds as they are received by local consortia.

Possible Funding Sources

Federal and National Funding Resources

While the Perkins Act provides funds for administering Tech Prep activities, innovative and experimental grants are also available to Tech Prep consortia that are willing to pioneer and test new ideas. The U.S. Department of Education offers a national demonstration grant project as part of the Perkins Act. But there are other federally funded grant programs that can support some of your Tech Prep initiatives. Following are examples of education programs that have granted funds to Tech Prep consortia:

- The Eisenhower Mathematics and Science Professional Development Program
- The Fund for Innovation in Postsecondary Education
- National Science Foundation—Advanced Technology Education Programs
- Technology Innovation Challenge Grants
- The Higher Education Act

You can find information about these grant programs through several means. The fastest, least expensive, and most efficient means is the Internet. Following are some Internet sources.

Listservs. The benefit of subscribing to a listserv is that it delivers information directly to you on a regular basis. Better yet, this is information someone else spent the time to find. And with listservs, delivery is quick and reliable. Most often you will not have to pay a fee to subscribe to a listserv. If you run across a listserv, go ahead and subscribe. It is easy to "unsubscribe" if the listserv does not serve your purpose.

To get started as an active and informed grantseeker, subscribe to the listserv cited below. It will provide you with valuable information from the U.S. Department of Education in addition to grant information.

http://www.ed.gov/MailingLists/EDInfo/ei-annou.html

To subscribe to VOCNET-NCRVE listserv, send a message to majordomo@listlink.berkeley.edu or call Carrie Collins at 800-762-4093.

Web Sites and Online Publications. Most federal and state agencies have web sites listing grant competitions.

U.S. Department of Education—http://www.ed.gov/funding.html

Other sites describe grant competitions for many federal agencies.

Federal Register—
http://www/access/gpo.gov/su_docs/aces/accs140.html

Commerce Business Daily—http://cbdnet.gpo.gov

U.S. Opportunity Alert (fee-based subscription)—
http://www.rams-fie.com

FEDIX Opportunity Alert—http://www.rams-fie.com

In addition, many publications have web sites that describe funding opportunities.

Education Week—http://www.edweek.org

Chronicle of Higher Education—http://chronicle.merit.edu

Paper Subscriptions. Technology is indeed a timesaver and, since there is no charge to view web sites, a moneysaver as well. But sometimes you just cannot beat newspapers and informative newsletters. Remember, these resources will require money for subscriptions. Be a smart shopper and spend funds on the resources that are best for you. Ask for free samples before subscribing. Think carefully about the best newspaper or newsletter to subscribe to in order to tailor your grants library to your needs. Below are a few titles to consider. These are reliable resources with announcements of national grant opportunities. They cover all areas and even feature announcements of funding restricted by demographics or region. And the newspapers provide additional information that should be scanned on a regular basis. Among these sources are federal, foundation, vocational, and education focuses, so be certain you understand the focus before subscribing.

Aid for Education—Semimonthly report on news, views, and federal and private grants

Chronicle of Higher Education—Grant announcements in addition to higher education information

The Chronicle of Philanthropy—Monthly newspaper reviewing the latest in corporate, private foundation, and organization funding opportunities

Education Grants Alert—Weekly newsletter listing grant announcements

Education Week—Weekly newspaper with announcements of funding opportunities and information interesting to anyone with interest in education

Federal Assistance Monitor—Semimonthly report on federal and private grant opportunities

Federal Grants and Contracts Weekly—Weekly newsletter listing federal funding opportunities

Foundation and Corporate Grants Alert—Monthly newsletter describing funding opportunities from private foundations and organizations

Education-Related Organizations

Education-related organizations often post funding notices. Don't forget to check the web sites of organizations you may belong to or organizations related to your work. Some list funding opportunities they think their members would benefit from knowing about. Bookmark these sites and check them. You never know what you may find. The following web site is a good place to start.

http://www.academicinnovations.com/tpfunds.html

State and Local Funding Resources

Local Education Service Center Web Site. Another important bookmark you need is one for your local education service center. Bookmark the page with the funding information to prevent you from having to search the entire site each time.

Local Library. Check with your local library—even if it is smaller than the library in your school district. Public libraries often have a wealth of information you can use. Some libraries have grant departments that subscribe to those expensive newsletters, newspapers, and books you could not afford to purchase.

Local Newspapers. Any time you scan a newspaper, be on the lookout for funding opportunities. You never know when a local philanthropist might have money to share.

State Education Web Site. You probably already have your own method of keeping in touch with your state education agency. Don't forget to bookmark the page on the agency's web site for funding opportunities. Inquire about the contact person for grants and keep the name in your Rolodex. This is also the best way to keep up with the numerous state organizations that offer funds. And watch for opportunities to subscribe to listservs as a way of keeping up with the funding announcements.

State Tech Prep Web Site. By now, this is a familiar contact. Be sure to include the web site in your funding opportunity bookmarks. Your state Tech Prep office will have information from federal departments and can tell you what federal funds will be available on a statewide and local basis.

First Steps Toward Seeking Funds

There are three basic options for seeking funds.

1. Government grants—Seeking grants requires lots of research and writing to make sure that your needs match the needs of the funding provider. The greatest difficulty is making sure that you are competitive in seeking a grant; otherwise, you can waste a lot of time and effort.
2. Private foundations/corporate giving—A private foundation is most beneficial to a local consortium if the foundation has a local interest in using its funds. Newer foundations tend to be more willing to take risks; establishing a good relationship with a foundation improves your chances of receiving funds again. Corporations disburse funds more quickly than government agencies and require less paperwork. The smaller the amount, the less administrative review and approval required.
3. Capital campaigns/bond elections—These types of funding require considerable leadership, time, and planning. Think carefully before embarking on this type of fundraising and be

sure to work within the existing educational system; the politics of working outside the system can be dangerous.

It is important to realize that there may be a need to pursue a combination of these three options to obtain the funds you need for your consortium. However, before you can determine what methods are best for you, you must do some planning. Consider the following steps:

1. Make sure that you have clearly defined the reason for and goals of Tech Prep in your consortium for the next five years.
2. Develop a long-term strategic plan for carrying out Tech Prep in the next five years.
3. Determine what additional funds you will need each year.
4. Identify innovative or experimental ideas that you would like to pursue as part of your strategic plan.
5. Define special projects that need additional resources.
6. Meet with the grants coordinators for the participating schools/colleges in your consortium and make them aware of your plans and funding needs. (These coordinators can save you a lot of time.)
7. Work with your grants coordinators, if possible, to identify local, state, and national funding sources.
8. Form any necessary partnerships or better align members of the consortium in order to be more competitive in the grants process.
9. Meet with the funding source to gain a better understanding of its interests.
10. Plan to seek and apply for funds for projects at least one year before you need the funds.

11. Find someone in your consortium with good writing skills to help you prepare applications.

12. If you receive funding, make sure that you stay in close contact with the funding source and keep it involved in your efforts.

OBSTACLES TO IMPLEMENTING TECH PREP PROGRAMS

Overcoming Parents' Misperceptions

Many parents believe that four-year college degrees will secure their children's places in the shrinking middle class. They are not interested in other educational options because they believe there is only one way to achieve success—attend college and earn a degree.

Some parents also believe that the *B*s and *C*s earned in college-prep courses will prepare their children for college, especially if a college has already accepted them. These same parents are then shocked when their children are required to take remedial courses in college before starting to work on their degree plans.

A vast majority of parents encourage their children to focus on managerial/professional occupations because they are not aware of the highly paid technical jobs available today. If financial resources are available, most parents feel their children should have the chance to attempt college curricula. However, they may not even consider using such resources to pursue technical courses. These parents are not informed about the benefits of Tech Prep and how it has transformed the vocational-technical education they remember from their high school days.

Informed parents will become supportive parents. When parents understand the target student population of Tech Prep—the middle majority—they realize Tech Prep is not a program for "someone else's child," but rather a viable option for future career success. Providing a variety of opportunities for parents to learn about the Tech Prep concept can open the door to new attitudes. Holding events such as a parents' night to discuss program components, labor market trends, available resources, and the type of education required to enter technical careers will shed new light on their children's options for the future. Offering parents easy access to information, such as

through a web site that addresses their questions and concerns about Tech Prep, can be a step toward breaking down outdated or incorrect perceptions about the new face of technical education.

Career Guidance Support for Students

Many students live within their own perception of the world and don't think about the future or how they will earn a living. Students believe there will be plenty of time to "get serious" about academic and career pursuits when they go to college. Consequently, they fail to consider the educational foundation necessary for success after high school.

Career guidance and development is a critical component of any Tech Prep program. Students need assistance in defining their career interests and they should understand their aptitudes and abilities. They need ongoing support to develop and pursue their career goals, and they need to see a direct relationship between their education and the world of work. Connecting students to the workplace through job shadowing, internships, apprenticeships, and projects will encourage them to plan for their futures. With the implementation of these strategies and others, students may begin to view learning as a lifelong process that includes their high school education.

Employer Involvement

Employers often form their perception of schools and young people through the media, which don't always portray teenagers in a positive light. Many employers haven't visited a high school since they graduated. Therefore, they are unaware of changes in curricula and innovative efforts by teachers to help students succeed.

Tech Prep can strengthen employers' commitment to education. A Tech Prep consortium can be the link that connects the two entities. To begin building such a connection, consortia should provide employers with a clear definition of Tech Prep. Employers also must be made aware of Tech Prep's benefits to their industries.

Initiating an open dialogue between educators and employers will encourage the development of successful Tech Prep programs. Both groups must discuss their concerns openly and honestly and each group must respect the needs of the other. Through such a collaboration and ongoing participation, employers will recognize that their involvement in Tech Prep will increase the talent of their labor pool. Such recognition should provide the impetus for continuing support from the business community for local Tech Prep efforts.

ADVICE FROM EXPERIENCED TECH PREP DIRECTORS

From Wendy Johnson, Assistant Director, Miami Valley Tech Prep Consortium at Sinclair Community College, winner of 1996 AACC Parnell Tech Prep Award

Successfully expanding Tech Prep to meet the needs of students and employers is an extensive undertaking. It is not a one-person job. Therefore, it is important to approach the challenge like a newly hired symphony conductor in a small- to mid-size city. There are many musicians in the town and most of them have full-time jobs, families, and other interests to juggle. They can all be pulled together to do something very important for the community—provide beautiful music, a culture of sound. It's not something a symphony conductor could even begin to do alone. These musicians take their passion for the symphony into every other aspect of their lives and their enthusiasm is reflected in the full houses at performances.

Here are three key strategies to building a Tech Prep community and a culture of commitment to and support for the mission that is Tech Prep:

1. *Make Tech Prep a part of the vision and long-range plan of member educational institutions and companies.* Work to have schools, colleges, companies, and community organizations like chambers of commerce use Tech Prep as a critical strategy to accomplish their goals. Relate Tech Prep to their strategic plans or continuous improvement plans. Work to have it be part of their budgets, calendars, and job titles and responsibilities. Start at the top with community college presidents, school superintendents, and CEOs to implement this strategy.
2. *Create a pool of cheerleaders, spokespersons, and Tech Prep champions who will both expand Tech Prep and*

increase people's willingness to change. Because people's willingness to change is proportional to their sense of ownership, it is important to engage people in implementing Tech Prep. We are not merely asking people to get out of the way, we are asking them to be part of a growing community that is improving education for students in the academic middle and strengthening our community through workforce development. Approach program development and student recruitment by developing networks of people that together accomplish these projects. Offer celebratory professional development and provide people with tools to communicate about, develop, and deliver Tech Prep.

3. *Reflect Tech Prep.* Tech Prep at its roots is a philosophy about learning and teaching, organizing, and leading. Reflect this in meetings, for example, by engaging participants rather than presenting to an audience. Reflect this in planning by involving the audience being planned for. When designing in-service training for counselors, involve the counselors and support them as they take lead roles in facilitating development for their colleagues. Educators and employers have a tendency to talk at each other. Facilitate more meaningful relationships through projects like establishing mentoring programs. Provide employers with tools to be Tech Prep messengers.

The only reason to be an epicenter in this business is to create a wave. Grow to be amused by people walking into "your" meetings and events only to ask, "Hey, who is in charge here?"

From Debbie Mills of Danville Area Community College, winner of the 1998 AACC Parnell Tech Prep Award

1. Identify key groups in Tech Prep and their roles and responsibilities: secondary academic and technical faculty, counselors, and administrators; community college faculty,

counselors, and administrators; university faculty, counselors, and administrators; business, industry, and labor people; students; and parents.

2. Define strategies for gaining key group commitment: Link planning to a local vision; explain potential outcomes and benefits of Tech Prep; be flexible and willing to change; make it comfortable for people to participate; encourage and reward people for their hard work; create a special environment for Tech Prep activities (food, music, fun, giveaways); be open and honest in dealing with problems; let people know that you value their input.

3. Create leadership teams in individual schools: Commit personal time and energy (leadership stipend); communicate the importance of Tech Prep—be a cheerleader; establish the teams' link to the schools—they coach and support the staff in the buildings, they allocate the resources, and they link people with information and resources; keep the teams moving; disseminate information.

4. Components of Tech Prep: local policies; business and industry collaboration; staff development; articulation; curriculum development; career development/counseling; marketing.

5. Staff development: Think outside the box for development beyond traditional workshops. Share "best practices" between schools; train the trainer (you provide PowerPoint presentation, script, handouts, then train your school leaders to go out to the masses).

6. Working with business and industry: You must meet a business and industry need or you won't be successful. Team up and have regular planning meetings with the local chamber and economic development group. Find out what their problems are and be part of the solution. Don't take the model to business sites for work-based learning; instead, ask

them what will work for them, show them different models, and create a new one. Be flexible. Business and industry are your customers.

7. Overcoming barriers: Communicate the vision of Tech Prep clearly, honestly, and enthusiastically ("It's the best thing since sliced bread" and have backup data); keep the initiative going by doing something to stay in the news (don't ride the tide); build support among respected leaders—win them one at a time through small conversations asking for their input, not their help; don't allow those who oppose Tech Prep to steer it off course, but answer their concerns and move ahead (don't waste time trying to persuade uncommitted educators who are just waiting to retire); don't settle for the rhetorical (question and dig for the true answers); know your schools (who's who

8. Bits-n-pieces: Get to know the classroom teachers who attend your workshops. Let them know that you know who they are by addressing notes using their first names when you send them things (e.g. articles, conference information, helpful tools) pertinent to their fields. Send something to your team every three weeks. When you go to conferences, take address labels for your school team leaders; when you find a vendor that has something of interest to that school, peel the label, and ask that materials be sent. The team leaders will be flattered that you remembered them.

9. Evaluate, evaluate, evaluate. Don't be afraid of the skeletons in your closet; they are there anyway. Get data to show what the schools are not doing or how the students are performing, and present it in an unemotional way. Develop mini-grants to help schools correct some of their problems (e.g., our NCRVE study showed many students weren't following career pathways. I put the data on the table to our business people and educators; then developed a mini-grant proposal

that would allow schools to have some monies to help correct this problem. They ate it up!). Involve your school/team leaders in what should be evaluated and how it should be evaluated so it then becomes their data, their problem, and their solution. You become the hero with tools (resources, $$, information) to correct the problem. Create rewards to reinforce quality improvement. Let schools evaluate each other (to get the money from career pathways, mini-grant schools had to present what they had done to the entire steering committee and they were rated).

10. Join organizations in which business, industry, and labor are involved (Rotary, other clubs). You want members to feel comfortable around you.

11. Take school people with you to meetings, state conferences, national conferences. Every time that you (as the coordinator) are learning, you should have a classroom teacher or counselor beside you. This increases their knowledge, builds friendship between you, and allows them to see the bigger picture.

12. Empower students. Take them with you (#11) to meetings and conferences. Kids have the best ideas; listen to them.

13. Get to know the state staff. They can be your best resources. Besides, theirs is the hand that feeds you. Get to know national figures.

14. Let your legislators know what you are doing or trying to do. Tell them you want to be part of the solution for economic development. Involve them; ask for their input. I once invited a legislator to make a presentation with me at a state conference. He did!

From Darlene Blake, State Tech Prep Director from Virginia

1. Do your homework. Learn about how Tech Prep has been administered in your area. Learn who the key players are in secondary/postsecondary/guidance/ academic/ technical arenas. Learn what mistakes were made, and don't repeat them. Learn about the successes, and build upon them. Read books and publications upon which the Tech Prep concept is based.
2. Use a steering committee or an advisory board made up of representative members from all institutions in your consortium, employer representatives, and community/parent contacts. With your steering committee, decide on a vision for the future and set goals for the consortium.
3. Set objectives and strategies to help you achieve your consortium's goals.
4. Network with other Tech Prep directors, both new and experienced. Learn from each other. Help each other. Communicate often.
5. Join and become active in the National Tech Prep Network. Read the newsletters, and attend the meetings for your own professional development.
6. Cultivate one or two people at each consortium member school. Let them be your key contacts at that site. Eventually try to have a Tech Prep team at each school in your consortium. The ideal team consists of an academic teacher, a technical teacher, a counselor, and an administrator. These teams will make communication and implementation much more efficient.
7. Cultivate partnerships with employers. Make them active participants in the planning and implementation process.

8. Market Tech Prep by defining the benefits to each target group: students, parents, counselors, teachers, employers, and administrators.
9. Assess each activity and project.
10. Evaluate progress toward goals; make modifications where necessary.

From Kathie Schmidt, Career Development Manager at Palm Beach County School District, winner of the 1996 AACC Parnell Tech Prep Award

1. Build partnerships—Involve your stakeholders, educators, students, parents, business community, and community-based organizations in as many aspects of your efforts as possible. If they are involved from the beginning, from the planning stages on through to the culminating activities, they will have a personal sense of responsibility and true partnership.
2. Market, market, market—All the wonderful pathways and programs will be of no value if the students don't enroll, successfully complete high school, and continue to postsecondary programs and successful employment. Students, parents, teachers, counselors, and the community need to be aware of the many wonderful opportunities available to them through Tech Prep.
3. Stay informed—Ever-changing federal and state legislation can dramatically impact the delivery of quality career development and academic and technical education. Staying current with legislation and funding opportunities is critical.
4. Get involved—Get active within your educational community. Countless opportunities will arise for you to support other initiatives with Tech Prep and to let others learn about it.
5. Share your successes—Take the initiative to present Tech Prep at conferences, write articles, and submit "best

practices." Share your experiences with other districts whose students, too, may benefit from the lessons you've learned. And, don't forget to let your legislators know what's happening as well. You never know what impact the information may have.

6. Expansion—Your local community colleges or technical centers need not be your only postsecondary partners for articulation. The Carl Perkins Vocational and Technical Education Act of 1998 now permits Tech Prep consortia to include baccalaureate degree-granting institutions, and employer and labor organizations.

7. Work-based learning—Make certain to provide your students with the valuable lessons learned from real-world worksite career experiences. This, too, is now allowable for vocational technical students under the 1998 Perkins Act.

8. Professional development—Keep yourself and others informed. Innovative instructional methods, labor market information, career guidance activities, integration strategies, applied learning methods, and brain-based learning information are but a sampling of the variety of important topics that will benefit your teachers, counselors, administrators, business partners, and, ultimately, your students.

9. Raising the bar—Keep your focus always on student achievement of rigorous academic and industry-driven technical standards. Our students' success in the twenty-first century depends upon it!

10. Celebrate!—Make an effort to recognize the achievements of your students. They have worked long and hard and deserve recognition for their efforts. Invite your partners to participate as you celebrate your students' accomplishments. It's a win-win situation for everyone!

From Jack Steinicke of Lakeland Tech Prep Consortium, winner of the 1998 AACC Parnell Tech Prep Award

1. Develop a thorough understanding of the Carl Perkins Act, particularly how it defines Tech Prep.
2. Understand how your state and consortium members interpret Tech Prep and what they expect from you.
3. Determine who the decision makers are within your consortium.
4. Try to gain an understanding of how decisions are made in your consortium.
5. Hire an adequate number of effective support personnel to assist you.
6. Create an effective and fair system of allocating funds.
7. Establish a network of key players who are committed to Tech Prep and are in positions to influence change.
8. Be sensitive to "turf issues" within the consortium.
9. Establish an effective communication system among all stakeholders within your consortium.

From Mabel Haralson, Director—Tech Prep/School-to-Work, of the Piedmont Area Consortium, winner of the 1997 AACC Parnell Tech Prep Award

1. Know the positive aspects of your Tech Prep initiative so that you can help market and/or promote and build upon them.
2. Do your homework, i.e., required reading. Examples include *The Neglected Majority* and *Why Do I Have to Learn This?* by Dale Parnell, *Making High Schools Work* by Gene Bottoms, and *Who Are You Calling Stupid?* by Dan Hull.
3. Be knowledgeable of outstanding programs regionally and nationally. Use successful model programs if they meet your needs and, if necessary, consider making revisions.
4. Know how to define your Tech Prep program—work toward a consensus definition so that everyone gives the same information when asked. Also, it is necessary to have this information for statistical purposes.
5. Know what resources are available to you, including human resources.
6. Know the movers and shakers in your partnership—the people who will help you reach your goals and objectives.
7. Know the Tech Prep, academic, and vocational curriculum in each school with which you work.
8. Work closely with secondary and postsecondary members to ensure that technical advanced-placement and dual-credit programs are in place and that articulation agreements are updated and are being implemented.
9. Constantly study, review, and remind consortium members of their vision and the need to keep it current.
10. Determine current education, business, community, parent, and student partnerships and work to strengthen the bonds and expand partnerships.

11. Include all partners in the development of a Tech Prep consortium plan from the beginning.

12. Be a diplomat and a problem solver, share information. Don't constantly reinvent the wheel. Know consortium needs, weaknesses, and strengths.

From Bob Carter, Director, Trident Area Consortium for the Technologies, winner of the 1998 AACC Parnell Tech Prep Award

1. Organize your consortium with a committee structure designed to meet main goals. Committee membership should represent a cross section of your partnership.

2. Organize your staff and assign duties to help the committees meet their and your objectives.

3. Develop a constitution and bylaws to fully govern your consortium.

4. Staff your senior policy board with appropriate stakeholders in your community.

5. Develop a clear set of instructions and responsibilities for the consortium and its fiscal agent.

6. Develop a system for communicating with your leadership team and others using face-to-face meetings, E-mail, fax, telephone, and regular mail.

7. Develop a strong rapport with your state education representatives to ensure your consortium stays on course.

8. Organize an alliance of consortium coordinators and directors in your state so that you can help each other meet common goals and solve common problems.

9. Attend national conferences like the National Tech Prep Network Conference to obtain a national perspective on Tech Prep/School to Work.

10. Always be fair, impartial, and up-front with your partners.

GLOSSARY

Academy—School within a school that prepares students for industry-specific careers through a combination of school-based curriculum and work-based experiences

Applied academics—A practical method of contextual teaching and learning that puts academics in the context of real-life and workplace - experiences. Examples of applied academics can be found in the mathematics and science materials developed by CORD. See page 3 for further explanation.

Apprenticeships—Programs that use the workplace as a learning environment to develop students' competencies in technical areas and related mathematics, science, communication, and problem solving. Students learn by doing in the workplace with the help of mentors. Some programs award recognized occupational credentials. Registered apprenticeships combine supervised, structured, on-the-job training with related theoretical instruction that is sponsored by employers or labor/management groups that have the ability to hire and train in a work environment.

Articulation—A process of coordinating policies and practices among sectors of the education system to produce a seamless flow of students from one level to another; an attitude of willingness of educators to work together to transcend the individual and institutional self-interest that impedes the maximum development of the student; and a goal to create an educational system without artificial divisions that eliminates loss of credit, delays, and unnecessary duplication of effort (W. Henry Con and James Hardy, "School University Network: Toward a Model of Articulation," *North Carolina Association Quarterly*, 1978)

Authentic assessment—A type of assessment that seeks to address widespread concerns about standardized, norm-referenced testing. It should reflect actual learning and instructional activities both in and

outside the classroom. Tools of authentic assessment are portfolios, observation, on-demand demonstrations, and so on.

Career major—A term roughly synonymous with "career pathway" but that incorporates both the career concept and the academic major concept that have existed in postsecondary and professional education

Career pathway—A coordinated educational process that is designed to prepare the student for a career or occupation. It is designed with a specific entry-level job in mind but incorporates broader and more complex skills.

Cluster—A group of related careers. Nearly all careers fall into one of a small number of clusters. Examples are business and marketing, engineering- and science-related, and health occupations.

Consortium—A local organization of people and entities with the ability, desire, and time to make significant changes in the local education system. The entities include at least one postsecondary institution, one or more high schools, employers representing the local labor market, civic and parent groups, and economic development groups.

Contextual learning—A proven concept that recognizes that learning is a complex, multifaceted process that goes far beyond drill-oriented, stimulus-and-response methodologies. Learners process new information in such a way that it makes sense to them in their own frames of reference. See page 30.

Cooperative learning—A process of teaching and learning that involves students collaborating and interacting in the achievement of shared learning goals

Core curriculum—Content common to most career clusters

Internship—A program of working under supervision in an occupational area for experience in a specific field; gaining practical experience

Job shadowing—A learning situation in which a student follows an individual as he or she performs workplace tasks for a designated number of days. The student experiences the work environment and better understands the types of skills needed for specific occupations.

Mentoring—An organized system of pairing a Tech Prep student with an adult who is working in the student's chosen career field

Occupational specialty—A category of jobs within a career that is commonly recognized by employers. Sometimes this is called a "technical specialty."

Performance assessment—The measurement of educational achievement through observation of the performance of tasks that call for the student to produce a response like that required in the environment in which the knowledge, skill, or attitude being assessed will be used

Portfolio assessment—A type of performance assessment that requires students, teachers, parents, and employers to reflect upon overall student outcomes through portfolios. The portfolio showcases a student's best work or work in progress, producing a record of mastery or a movement toward mastery over time.

Project-based learning—A process of teaching and learning that involves a relevant and authentic problem. Project-based learning should involve a scenario of an authentic workplace problem, students should be required to use high-level skills and knowledge from at least one academic discipline, the solution should involve use of information technology, the project must engage students for a sustained effort, and the problem should be solved using teams.

SCANS—Secretary's Commission on Achieving Necessary Skills. See page 4.

School to Work—An educational reform movement focused on workforce training initiatives. See page 5.

Skill standards—Statements of expectation, including benchmarks, for demonstrated knowledge or performance of tasks required for a worker to perform satisfactorily in a given occupation or job

Tech Prep—A dynamic educational reform movement that involves partnerships, teaching and learning processes, and curriculum structures to prepare any student to enter and succeed in a career

Technical core curriculum—A set of courses typically taught in the high school that build on a contextually based academic curriculum and are common to one broad technical field. See page 18.

Worksite learning—Learning that occurs at the job site and that focuses mostly on work skills and knowledge. Typical strategies for worksite learning are job shadowing, mentoring, internships, apprenticeships, and cooperative work assignments.